

**What is claimed is:****1. Use of a metal complex compound of formula (1)**

wherein Me is manganese, titanium, iron, cobalt, nickel or copper,  
 X is a coordinating or bridging radical,  
 n and m are each independently of the other an integer having a value of from 1 to 8,  
 p is an integer having a value of from 0 to 32,  
 z is the charge of the metal complex,  
 Y is a counter-ion,  
 q = z/(charge Y), and  
 L is a ligand of formula (2)



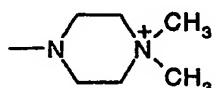
wherein

R<sub>1</sub>, R<sub>2</sub>, R<sub>3</sub>, R<sub>4</sub>, R<sub>5</sub>, R<sub>6</sub>, R<sub>7</sub>, R<sub>8</sub>, R<sub>9</sub>, R<sub>10</sub> and R<sub>11</sub> are each independently of the others hydrogen; unsubstituted or substituted C<sub>1</sub>-C<sub>18</sub>alkyl or aryl; cyano; halogen; nitro; -COOR<sub>12</sub> or -SO<sub>3</sub>R<sub>12</sub> wherein R<sub>12</sub> is in each case hydrogen, a cation or unsubstituted or substituted C<sub>1</sub>-C<sub>18</sub>alkyl or aryl; -SR<sub>13</sub>, -SO<sub>2</sub>R<sub>13</sub> or -OR<sub>13</sub> wherein R<sub>13</sub> is in each case hydrogen or unsubstituted or substituted C<sub>1</sub>-C<sub>18</sub>alkyl or aryl; -NR<sub>14</sub>R<sub>15</sub>; -(C<sub>1</sub>-C<sub>6</sub>alkylene)-NR<sub>14</sub>R<sub>15</sub>; -N<sup>o</sup>R<sub>14</sub>R<sub>15</sub>R<sub>16</sub>; -(C<sub>1</sub>-C<sub>6</sub>alkylene)-N<sup>o</sup>R<sub>14</sub>R<sub>15</sub>R<sub>16</sub>; -N(R<sub>13</sub>)-(C<sub>1</sub>-C<sub>6</sub>alkylene)-NR<sub>14</sub>R<sub>15</sub>; -N[(C<sub>1</sub>-C<sub>6</sub>alkylene)-NR<sub>14</sub>R<sub>15</sub>]<sub>2</sub>; -N(R<sub>13</sub>)-(C<sub>1</sub>-C<sub>6</sub>alkylene)-N<sup>o</sup>R<sub>14</sub>R<sub>15</sub>R<sub>16</sub>; -N[(C<sub>1</sub>-C<sub>6</sub>alkylene)-N<sup>o</sup>R<sub>14</sub>R<sub>15</sub>R<sub>16</sub>]<sub>2</sub>; -N(R<sub>13</sub>)-N-R<sub>14</sub>R<sub>15</sub> or -N(R<sub>13</sub>)-N<sup>o</sup>R<sub>14</sub>R<sub>15</sub>R<sub>16</sub>, wherein R<sub>13</sub> is as defined above and R<sub>14</sub>, R<sub>15</sub> and R<sub>16</sub> are each independently of the other(s) hydrogen or unsubstituted or substituted C<sub>1</sub>-C<sub>18</sub>alkyl or aryl, or R<sub>14</sub> and R<sub>15</sub> together with the nitrogen atom bonding them form an unsubstituted or

substituted 5-, 6- or 7-membered ring which may optionally contain further heteroatoms;

with the proviso that

- (i) at least one of the substituents R<sub>1</sub>-R<sub>11</sub> contains a quaternized nitrogen atom which is not directly bonded to one of the three pyridine rings A, B or C and that
- (ii) Y is neither I<sup>-</sup> nor Cl<sup>-</sup> in the case that Me is Mn(II), R<sub>1</sub>-R<sub>5</sub> and R<sub>7</sub>-R<sub>11</sub> are hydrogen and R<sub>6</sub> is



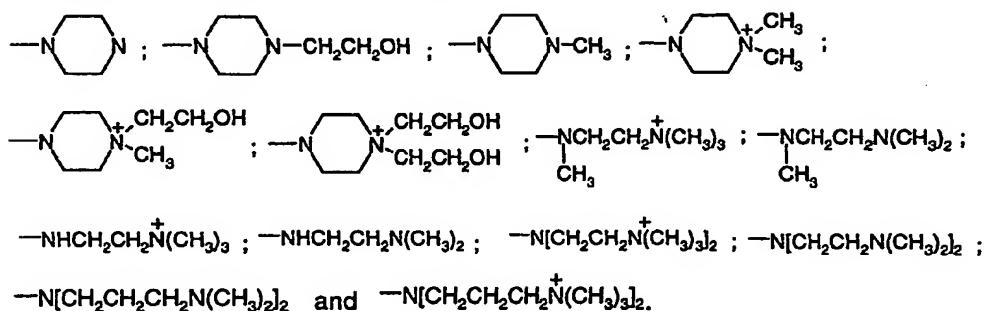
as catalysts for oxidation reactions.

2. Use according to claim 1, wherein Me is manganese which is present in oxidation state II, III, IV or V.
3. Use according to claim 1, wherein Me is iron which is present in oxidation state II, III or IV.
4. Use according to any one of claims 1, 2 and 3, wherein X is CH<sub>3</sub>CN, H<sub>2</sub>O, F<sup>-</sup>, Cl<sup>-</sup>, Br<sup>-</sup>, HOO<sup>-</sup>, O<sub>2</sub><sup>2-</sup>, O<sup>2-</sup>, R<sub>17</sub>COO<sup>-</sup>, R<sub>17</sub>O<sup>-</sup>, LMeO<sup>-</sup> or LMeOO<sup>-</sup> wherein R<sub>17</sub> is hydrogen, -SO<sub>3</sub>C<sub>1</sub>-C<sub>4</sub>alkyl, or unsubstituted or substituted C<sub>1</sub>-C<sub>18</sub>alkyl or aryl, and L and Me are as defined in claim 1.
5. Use according to any one of claims 1 to 4, wherein Y is R<sub>17</sub>COO<sup>-</sup>, ClO<sub>4</sub><sup>-</sup>, BF<sub>4</sub><sup>-</sup>, PF<sub>6</sub><sup>-</sup>, R<sub>17</sub>SO<sub>3</sub><sup>-</sup>, R<sub>17</sub>SO<sub>4</sub><sup>-</sup>, SO<sub>4</sub><sup>2-</sup>, NO<sub>3</sub><sup>-</sup>, F<sup>-</sup>, Cl<sup>-</sup>, Br<sup>-</sup>, I<sup>-</sup>, citrate, tartrate or oxalate wherein R<sub>17</sub> is hydrogen or unsubstituted or substituted C<sub>1</sub>-C<sub>18</sub>alkyl or aryl.
6. Use according to any one of claims 1 to 5, wherein n is an integer having a value of from 1 to 4, especially 1 or 2.
7. Use according to any one of claims 1 to 6, wherein m is an integer having a value of 1 or 2, especially 1.

8. Use according to any one of claims 1 to 7, wherein p is an integer having a value of from 0 to 4, especially 2.
9. Use according to any one of claims 1 to 8, wherein z is an integer having a value of from 8- to 8+.
10. Use according to any one of claims 1 to 9, wherein aryl is phenyl or naphthyl unsubstituted or substituted by C<sub>1</sub>-C<sub>4</sub>alkyl, C<sub>1</sub>-C<sub>4</sub>alkoxy, halogen, cyano, nitro, carboxyl, sulfo, hydroxyl, amino, N-mono- or N,N-di-C<sub>1</sub>-C<sub>4</sub>alkylamino unsubstituted or substituted by hydroxy in the alkyl moiety, N-phenylamino, N-naphthylamino, phenyl, phenoxy or by naphthoxy.
11. Use according to any one of claims 1 to 10 wherein the 5-, 6- or 7-membered ring formed by R<sub>14</sub> and R<sub>15</sub> together with the nitrogen atom bonding them is an unsubstituted or C<sub>1</sub>-C<sub>4</sub>alkyl-substituted pyrrolidine, piperidine, piperazine, morpholine or azepane ring, wherein the nitrogen atoms can optionally be quaternized.
12. Use according to any one of claims 1 to 11, wherein R<sub>6</sub> is C<sub>1</sub>-C<sub>12</sub>alkyl; phenyl unsubstituted or substituted by C<sub>1</sub>-C<sub>4</sub>alkyl, C<sub>1</sub>-C<sub>4</sub>alkoxy, halogen, cyano, nitro, carboxyl, sulfo, hydroxyl, amino, N-mono- or N,N-di-C<sub>1</sub>-C<sub>4</sub>alkylamino unsubstituted or substituted by hydroxy in the alkyl moiety, N-phenylamino, N-naphthylamino, phenyl, phenoxy or naphthoxy; cyano; halogen; nitro; -COOR<sub>12</sub> or -SO<sub>3</sub>R<sub>12</sub> wherein R<sub>12</sub> is in each case hydrogen, a cation, C<sub>1</sub>-C<sub>12</sub>alkyl, or phenyl unsubstituted or substituted as indicated above; -SR<sub>13</sub>, -SO<sub>2</sub>R<sub>13</sub> or -OR<sub>13</sub> wherein R<sub>13</sub> is in each case hydrogen, C<sub>1</sub>-C<sub>12</sub>alkyl, or phenyl unsubstituted or substituted as indicated above; -NR<sub>14</sub>R<sub>15</sub>; -(C<sub>1</sub>-C<sub>6</sub>alkylene)-NR<sub>14</sub>R<sub>15</sub>; -N<sup>9</sup>R<sub>14</sub>R<sub>15</sub>R<sub>16</sub>; -(C<sub>1</sub>-C<sub>6</sub>alkylene)-N<sup>9</sup>R<sub>14</sub>R<sub>15</sub>R<sub>16</sub>; -N(R<sub>13</sub>)-(C<sub>1</sub>-C<sub>6</sub>alkylene)-NR<sub>14</sub>R<sub>15</sub>; -N(R<sub>13</sub>)-(C<sub>1</sub>-C<sub>6</sub>alkylene)-N<sup>9</sup>R<sub>14</sub>R<sub>15</sub>R<sub>16</sub>; -N(R<sub>13</sub>)-N-R<sub>14</sub>R<sub>15</sub> or -N(R<sub>13</sub>)-N<sup>9</sup>R<sub>14</sub>R<sub>15</sub>R<sub>16</sub>, wherein R<sub>13</sub> can have one of the above meanings and R<sub>14</sub>, R<sub>15</sub> and R<sub>16</sub> are each independently of the other(s) hydrogen, unsubstituted or hydroxyl-substituted C<sub>1</sub>-C<sub>12</sub>alkyl, or phenyl unsubstituted or substituted as indicated above, or R<sub>14</sub> and R<sub>15</sub> together with the nitrogen atom bonding them form a pyrrolidine, piperidine, piperazine, morpholine or azepane ring which is unsubstituted or substituted by at least one unsubstituted C<sub>1</sub>-C<sub>4</sub>alkyl and/or substituted C<sub>1</sub>-C<sub>4</sub>alkyl, wherein the nitrogen atom can be quaternized, and

**R<sub>1</sub>, R<sub>2</sub>, R<sub>3</sub>, R<sub>4</sub>, R<sub>5</sub>, R<sub>7</sub>, R<sub>8</sub>, R<sub>9</sub>, R<sub>10</sub> and R<sub>11</sub> can be as defined in claim 1 or are hydrogen.**

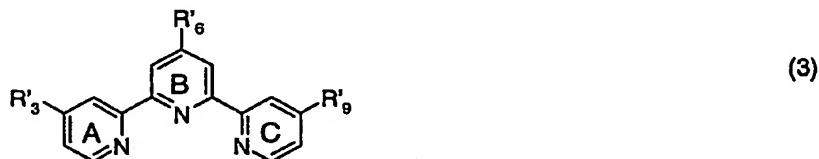
13. Use according to claim 12, wherein  $R_8$  is



and

$R_1, R_2, R_3, R_4, R_5, R_7, R_8, R_9, R_{10}$  and  $R_{11}$  are as defined above or are hydrogen.

14. Use according to claim 12 or 13, wherein the ligand L is a compound of formula



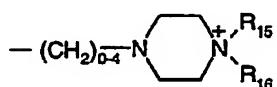
wherein

$R'_3$ ,  $R'_6$  and  $R'_9$  are as defined for  $R_6$  in claim 12 or 13, wherein  $R'_3$  and  $R'_9$  can additionally be hydrogen.

15. Use according to claim 14, wherein

R'3, R'6 and R'9 are each independently of the others phenyl unsubstituted or substituted by C1-C4alkyl, C1-C4alkoxy, halogen, phenyl or hydroxyl; cyano; nitro; -COOR12 or -SO3R12, wherein R12 is in each case hydrogen, a cation, C1-C4alkyl or phenyl; -SR13, -SO2R13 or -OR13 wherein R13 is in each case hydrogen, C1-C4alkyl or phenyl, -N(CH3)-NH2 or -NH-NH2; amino; N-mono- or N,N-di-C1-C4alkylamino unsubstituted or substituted by hydroxy in the alkyl moiety, wherein the nitrogen atoms, especially the nitrogen atoms which are not bonded to one of the three pyridine rings A, B or C, may be quaternized; N-mono- or N,N-di-C1-C4alkyl-N°R14R15R16, unsubstituted or substituted by hydroxy in the alkyl moiety, wherein R14, R15 and R16

are each independently of the others hydrogen, unsubstituted or hydroxyl-substituted C<sub>1</sub>-C<sub>12</sub>alkyl, or phenyl unsubstituted or substituted as indicated above, or R<sub>14</sub> and R<sub>15</sub> together with the nitrogen atom bonding them form a pyrrolidine, piperidine, morpholine or azepane ring unsubstituted or substituted by at least one C<sub>1</sub>-C<sub>4</sub>alkyl or by at least one unsubstituted C<sub>1</sub>-C<sub>4</sub>alkyl and/or substituted C<sub>1</sub>-C<sub>4</sub>alkyl wherein the nitrogen atom can be quaternized; N-mono- or N,N-di-C<sub>1</sub>-C<sub>4</sub>alkyl-NR<sub>14</sub>R<sub>15</sub> unsubstituted or substituted by hydroxy in the alkyl moiety, wherein R<sub>14</sub> and R<sub>15</sub> can have the meanings indicated above; or a radical



wherein R<sub>15</sub> and R<sub>16</sub> have the meanings indicated above, preferably C<sub>1</sub>-C<sub>4</sub>alkyl, and the ring may be substituted, where R'<sub>3</sub> and R'<sub>9</sub> can likewise be hydrogen.

16. Use according to claim 14 or 15, wherein R<sub>6</sub> is hydroxy.
17. Use according to any of claims 1-13, wherein at least one of the substituents R<sub>1</sub>-R<sub>11</sub>, preferably one of the substituents R<sub>3</sub>, R<sub>6</sub> and/or R<sub>9</sub>, is one of the following radicals -(C<sub>1</sub>-C<sub>6</sub>alkylene)-N°R<sub>14</sub>R<sub>15</sub>R<sub>16</sub>; -N(R<sub>13</sub>)-(C<sub>1</sub>-C<sub>6</sub>alkylene)-N°R<sub>14</sub>R<sub>15</sub>R<sub>16</sub>; -N[(C<sub>1</sub>-C<sub>6</sub>alkylene)-N°R<sub>14</sub>R<sub>15</sub>R<sub>16</sub>]<sub>2</sub>; -N(R<sub>13</sub>)-N°R<sub>14</sub>R<sub>15</sub>R<sub>16</sub>, wherein R<sub>13</sub> is in each case hydrogen, C<sub>1</sub>-C<sub>4</sub>alkyl or phenyl and R<sub>14</sub>, R<sub>15</sub> and R<sub>16</sub> are each independently of the others hydrogen or substituted or unsubstituted C<sub>1</sub>-C<sub>18</sub>alkyl or aryl, or R<sub>14</sub> and R<sub>15</sub> together with the nitrogen atom bonding them form a substituted or unsubstituted 5-, 6- or 7-membered ring which may contain further heteroatoms; or -NR<sub>14</sub>R<sub>15</sub>; -(C<sub>1</sub>-C<sub>6</sub>alkylene)-NR<sub>14</sub>R<sub>15</sub>; -N(R<sub>13</sub>)-(C<sub>1</sub>-C<sub>6</sub>alkylene)-NR<sub>14</sub>R<sub>15</sub>; -N[(C<sub>1</sub>-C<sub>6</sub>alkylene)-NR<sub>14</sub>R<sub>15</sub>]<sub>2</sub>; -N(R<sub>13</sub>)-N-R<sub>14</sub>R<sub>15</sub>, wherein R<sub>13</sub> and R<sub>16</sub> are as defined above and R<sub>14</sub> and R<sub>15</sub> together with the nitrogen atom bonding them form a 5-, 6- or 7-membered ring which is unsubstituted or substituted by at least one unsubstituted C<sub>1</sub>-C<sub>4</sub>alkyl and/or substituted C<sub>1</sub>-C<sub>4</sub>alkyl and may contain further heteroatoms, wherein at least one nitrogen atom which is not bonded to one of the pyridine rings A, B or C is quaternized.
18. Use according to any of claims 14-16, wherein at least one of the substituents R'<sub>3</sub>, R'<sub>6</sub> and R'<sub>9</sub>, preferably R'<sub>3</sub> and/or R'<sub>9</sub> is one of the following radicals

$-(C_1-C_6\text{alkylene})-N^{\oplus}R_{14}R_{15}R_{16}$ ;  $-N(R_{13})-(C_1-C_6\text{alkylene})-N^{\oplus}R_{14}R_{15}R_{16}$ ;  
 $-N[(C_1-C_6\text{alkylene})-N^{\oplus}R_{14}R_{15}R_{16}]_2$ ;  $-N(R_{13})-N^{\oplus}R_{14}R_{15}R_{16}$ , wherein  $R_{13}$  is in each case hydrogen,  $C_1$ - $C_4$ alkyl or phenyl and  $R_{14}$ ,  $R_{15}$  and  $R_{16}$  are each independently of the others hydrogen or substituted or unsubstituted  $C_1$ - $C_{18}$ alkyl or aryl, or  $R_{14}$  and  $R_{15}$  together with the nitrogen atom bonding them form a substituted or unsubstituted 5-, 6- or 7-membered ring which may contain further heteroatoms; or  $-NR_{14}R_{15}$ ;  
 $-(C_1-C_6\text{alkylene})-NR_{14}R_{15}$ ;  $-N(R_{13})-(C_1-C_6\text{alkylene})-NR_{14}R_{15}$ ;  
 $-N[(C_1-C_6\text{alkylene})-NR_{14}R_{15}]_2$ ;  $-N(R_{13})-N-R_{14}R_{15}$ , wherein  $R_{13}$  and  $R_{16}$  are as defined above and  $R_{14}$  and  $R_{15}$  together with the nitrogen atom bonding them form a 5-, 6- or 7-membered ring which is unsubstituted or substituted by at least one unsubstituted  $C_1$ - $C_4$ alkyl and/or substituted  $C_1$ - $C_4$ alkyl and may contain further heteroatoms, wherein at least one nitrogen atom which is not bonded to one of the pyridine rings A, B or C is quaternized.

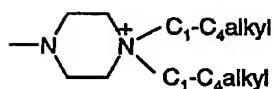
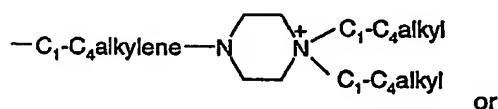
19. Use according to any of claims 1-13, wherein at least one of the substituents  $R_1$ - $R_{11}$ , preferably one of the substituents  $R_3$ ,  $R_6$  and/or  $R_9$ , is one of the following radicals  
 $-(C_1-C_4\text{alkylene})-N^{\oplus}R_{14}R_{15}R_{16}$ ;  $-N(R_{13})-(C_1-C_6\text{alkylene})-N^{\oplus}R_{14}R_{15}R_{16}$ ;  
 $-N[(C_1-C_6\text{alkylene})-N^{\oplus}R_{14}R_{15}R_{16}]_2$ ;  $-N(R_{13})-N^{\oplus}R_{14}R_{15}R_{16}$ , wherein  $R_{13}$  is as defined above and  $R_{14}$ ,  $R_{15}$  and  $R_{16}$  are each independently of the others hydrogen or substituted or unsubstituted  $C_1$ - $C_{12}$ alkyl or aryl, or  $R_{14}$  and  $R_{15}$  together with the nitrogen atom bonding them form a 5-, 6- or 7-membered ring which may be unsubstituted or substituted by at least one unsubstituted  $C_1$ - $C_4$ alkyl and/or substituted  $C_1$ - $C_4$ alkyl and may contain further heteroatoms; or  
 $-NR_{14}R_{15}$ ;  $-(C_1-C_6\text{alkylene})-NR_{14}R_{15}$ ;  $-N(R_{13})-(C_1-C_6\text{alkylene})-NR_{14}R_{15}$ ;  
 $-N[(C_1-C_6\text{alkylene})-NR_{14}R_{15}]_2$ ;  $-N(R_{13})-N-R_{14}R_{15}$ , wherein  $R_{13}$  and  $R_{16}$  are as defined above and  $R_{14}$  and  $R_{15}$  together with the nitrogen atom bonding them form a substituted or unsubstituted 5-, 6- or 7-membered ring which may contain further heteroatoms, wherein the nitrogen atom which is not bonded to one of the pyridine rings A, B or C is quaternized.
20. Use according to any of claims 14-16, wherein at least one of the substituents  $R_1$ - $R_{11}$ , preferably one of the substituents  $R_3$ ,  $R_6$  and/or  $R_9$ , is one of the following radicals  
 $-(C_1-C_4\text{alkylene})-N^{\oplus}R_{14}R_{15}R_{16}$ ;  $-N(R_{13})-(C_1-C_6\text{alkylene})-N^{\oplus}R_{14}R_{15}R_{16}$ ;

$-\text{N}[(\text{C}_1\text{-C}_6\text{alkylen})\text{-N}^{\text{o}}\text{R}_{14}\text{R}_{15}\text{R}_{16}]_2$ ;  $-\text{N}(\text{R}_{13})\text{-N}^{\text{o}}\text{R}_{14}\text{R}_{15}\text{R}_{16}$ , wherein  $\text{R}_{13}$  is as defined above and  $\text{R}_{14}$ ,  $\text{R}_{15}$  and  $\text{R}_{16}$  are each independently of the others hydrogen or substituted or unsubstituted  $\text{C}_1\text{-C}_{12}\text{alkyl}$  or aryl, or  $\text{R}_{14}$  and  $\text{R}_{15}$  together with the nitrogen atom bonding them form a 5-, 6- or 7-membered ring which is unsubstituted or substituted by at least one unsubstituted  $\text{C}_1\text{-C}_4\text{alkyl}$  and/or substituted  $\text{C}_1\text{-C}_4\text{alkyl}$  and may contain further heteroatoms; or

$-\text{NR}_{14}\text{R}_{15}$ ;  $-(\text{C}_1\text{-C}_6\text{alkylene})\text{-NR}_{14}\text{R}_{15}$ ;  $-\text{N}(\text{R}_{13})\text{-}(\text{C}_1\text{-C}_6\text{alkylene})\text{-NR}_{14}\text{R}_{15}$ ;

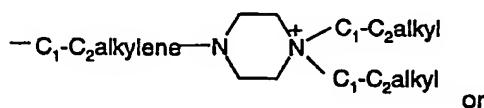
$-\text{N}[(\text{C}_1\text{-C}_6\text{alkylene})\text{-NR}_{14}\text{R}_{15}]_2$ ;  $-\text{N}(\text{R}_{13})\text{-N-R}_{14}\text{R}_{15}$ , wherein  $\text{R}_{13}$  and  $\text{R}_{16}$  are as defined above and  $\text{R}_{14}$  and  $\text{R}_{15}$  together with the nitrogen atom bonding them form a substituted or unsubstituted 5-, 6- or 7-membered ring which may contain further heteroatoms, wherein the nitrogen atom which is not bonded to one of the pyridine rings A, B or C is quaternized.

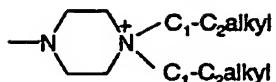
21. Use according to claim 19 or 20, wherein at least one of the substituents  $\text{R}_1\text{-R}_{11}$ , preferably one of the substituents  $\text{R}_3$ ,  $\text{R}_6$  and/or  $\text{R}_9$ , is one of the radicals



wherein the unbranched or branched alkylene group may be substituted, and wherein the independently unbranched or branched alkyl groups may be substituted and wherein the piperazine ring may be substituted.

22. Use according to claim 21, wherein at least one of the substituents  $\text{R}_1\text{-R}_{11}$ , preferably one of the substituents  $\text{R}_3$ ,  $\text{R}_6$  and/or  $\text{R}_9$ , is one of the radicals





wherein the unbranched or branched alkylene group may be substituted, and wherein the alkyl groups may be substituted independently of the other and wherein the piperazine ring may be substituted.

23. Use according to any one of claims 1 to 22, wherein a metal complex compound of formula (1) is used in a washing, cleaning, disinfecting or bleaching agent.
24. Use according to claim 23, wherein a metal complex compound of formula (1) is formed *in situ* in the washing, cleaning, disinfecting or bleaching agent.
25. Use according to any one of claims 1 to 24, wherein a metal complex compound of formula (1) is used together with a peroxy compound for the bleaching of spots or stains on textile material or for the prevention of the redeposition of migrating dyes in the context of a washing process or for the cleaning of hard surfaces.
26. Use according to any one of claims 1 to 22, wherein a metal complex compound of formula (1) according to claim 1 is used as a catalyst for reactions with a peroxy compound for bleaching in the context of paper-making.
27. Use according to any one of claims 1 to 22, wherein a metal complex compound of formula (1) according to claim 1 is used as a catalyst for the waste water treatment.
28. Use according to any one of claims 1 to 22, wherein a metal complex compound of formula (1) according to claim 1 is used as a catalyst for the delignification of cellulose.
29. Use according to any one of claims 1 to 22, wherein mixtures of manganese complexes of the formula (1) with iron complexes of the formula (1) are used for preventing the redeposition of migrating dyes and at the same time bleaching of spots or stains on textile material.

30. Use according to claim 29, wherein mixtures of manganese complexes of the formula (1) with iron complexes of the formula (1'), which corresponds to the formula (1) but contains no quaternized nitrogen atoms, are used.

31. A metal complex compound of formula (1a)



wherein Me is manganese, titanium, iron, cobalt, nickel or copper,

X is a coordinating or bridging radical,

n and m are each independently of the other an integer having a value of from 1 to 8,

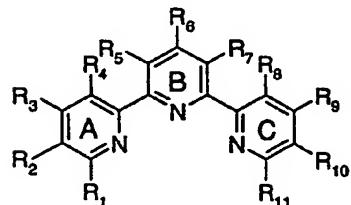
p is an integer having a value from 0 to 32,

z is the charge of the metal complex,

Y is a counter-ion,

q = z/(charge Y), and

L is a ligand of formula (2a)



(2a)

wherein

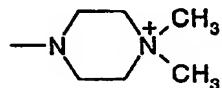
R<sub>6</sub> is unsubstituted or substituted C<sub>1</sub>-C<sub>18</sub>alkyl or aryl; cyano; halogen; nitro; -COOR<sub>12</sub> or -SO<sub>3</sub>R<sub>12</sub> wherein R<sub>12</sub> is in each case hydrogen, a cation or unsubstituted or substituted C<sub>1</sub>-C<sub>18</sub>alkyl or aryl; -SR<sub>13</sub>, -SO<sub>2</sub>R<sub>13</sub> or -OR<sub>13</sub> wherein R<sub>13</sub> is in each case hydrogen or unsubstituted or substituted C<sub>1</sub>-C<sub>18</sub>alkyl or aryl; -NR<sub>14</sub>R<sub>15</sub>; -(C<sub>1</sub>-C<sub>6</sub>alkylene)-NR<sub>14</sub>R<sub>15</sub>; -N<sup>9</sup>R<sub>14</sub>R<sub>15</sub>R<sub>16</sub>; -(C<sub>1</sub>-C<sub>6</sub>alkylene)-N<sup>9</sup>R<sub>14</sub>R<sub>15</sub>R<sub>16</sub>; -N(R<sub>13</sub>)-(C<sub>1</sub>-C<sub>6</sub>alkylene)-NR<sub>14</sub>R<sub>15</sub>; -N[(C<sub>1</sub>-C<sub>6</sub>alkylene)-NR<sub>14</sub>R<sub>15</sub>]<sub>2</sub>; -N(R<sub>13</sub>)-(C<sub>1</sub>-C<sub>6</sub>alkylene)-N<sup>9</sup>R<sub>14</sub>R<sub>15</sub>R<sub>16</sub>; -N[(C<sub>1</sub>-C<sub>6</sub>alkylene)-N<sup>9</sup>R<sub>14</sub>R<sub>15</sub>R<sub>16</sub>]<sub>2</sub>; -N(R<sub>13</sub>)-N-R<sub>14</sub>R<sub>15</sub> or -N(R<sub>13</sub>)-N<sup>9</sup>R<sub>14</sub>R<sub>15</sub>R<sub>16</sub>, wherein R<sub>13</sub> is as defined above and R<sub>14</sub>, R<sub>15</sub> and R<sub>16</sub> are each independently of the other(s) hydrogen or unsubstituted or substituted C<sub>1</sub>-C<sub>18</sub>alkyl or aryl, or R<sub>14</sub> and R<sub>15</sub> together

with the nitrogen atom bonding them form an unsubstituted or substituted 5-, 6- or 7-membered ring which may optionally contain further heteroatoms; and

R<sub>1</sub>, R<sub>2</sub>, R<sub>3</sub>, R<sub>4</sub>, R<sub>5</sub>, R<sub>7</sub>, R<sub>8</sub>, R<sub>9</sub>, R<sub>10</sub> and R<sub>11</sub> are each independently of the others as defined above for R<sub>6</sub> or are hydrogen or unsubstituted or substituted aryl,

with the proviso that

- (i) at least one of the substituents R<sub>1</sub>-R<sub>11</sub> contains a quaternized nitrogen atom which is not directly bonded to one of the three pyridine rings A, B or C and that
- (ii) Y is neither I<sup>-</sup> nor Cl<sup>-</sup> in the case that Me is Mn, R<sub>1</sub>-R<sub>5</sub> and R<sub>7</sub>-R<sub>11</sub> are hydrogen and R<sub>6</sub> is



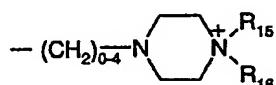
32. A metal complex compound according to claim 31, wherein Me is manganese which is present in oxidation state II, III, IV or V.
33. A metal complex compound according to claim 31, wherein Me is iron which is present in oxidation state II, III or IV.
34. A metal complex compound according to either claim 32 or claim 33, wherein the ligand L is a compound of formula (3)



wherein

R'8 is cyano; halogen; nitro; -COOR<sub>12</sub> or -SO<sub>3</sub>R<sub>12</sub> wherein R<sub>12</sub> is in each case hydrogen, a cation, C<sub>1</sub>-C<sub>12</sub>alkyl, or phenyl unsubstituted or substituted by C<sub>1</sub>-C<sub>4</sub>alkyl, C<sub>1</sub>-C<sub>4</sub>alkoxy, halogen, cyano, nitro, carboxyl, sulfo, hydroxyl, amino, N-mono- or N,N-di-C<sub>1</sub>-C<sub>4</sub>alkyl-amino unsubstituted or substituted by hydroxy in the alkyl moiety, N-phenylamino, N-naphthylamino, where the amino groups may be quaternized, phenyl, phenoxy or by naphthoxy; -SR<sub>13</sub>, -SO<sub>2</sub>R<sub>13</sub> or -OR<sub>13</sub> wherein R<sub>13</sub> is in each case hydrogen, C<sub>1</sub>-C<sub>12</sub>alkyl, or phenyl unsubstituted or substituted as indicated above; -NR<sub>14</sub>R<sub>15</sub>; -N<sup>+</sup>R<sub>14</sub>R<sub>15</sub>R<sub>16</sub>;

$-\text{N}(\text{R}_{13})-(\text{CH}_2)_{1-6}\text{NR}_{14}\text{R}_{15}$ ;  $-\text{N}(\text{R}_{13})-(\text{CH}_2)_{1-6}\text{N}^{\oplus}\text{R}_{14}\text{R}_{15}\text{R}_{16}$ ;  $-\text{N}(\text{R}_{13})-\text{N}-\text{R}_{14}\text{R}_{15}$  or  
 $-\text{N}(\text{R}_{13})-\text{N}^{\oplus}\text{R}_{14}\text{R}_{15}\text{R}_{16}$ , wherein  $\text{R}_{13}$  can be as defined above and  $\text{R}_{14}$ ,  $\text{R}_{15}$  and  $\text{R}_{16}$  are each independently of the other(s) hydrogen, unsubstituted or hydroxyl-substituted  $\text{C}_1\text{-C}_{12}$ alkyl, or phenyl unsubstituted or substituted as indicated above, or  $\text{R}_{14}$  and  $\text{R}_{15}$  together with the nitrogen atom bonding them form a pyrrolidine, piperidine, morpholine or azepane ring which is unsubstituted or substituted by at least one unsubstituted  $\text{C}_1\text{-C}_4$ alkyl and/or substituted  $\text{C}_1\text{-C}_4$ alkyl, wherein the nitrogen atom can be quaternized;  
or a radical



wherein  $\text{R}_{15}$  and  $\text{R}_{16}$  are as defined above and the ring may be substituted; and  $\text{R}'_3$  and  $\text{R}'_9$  are as defined above or are hydrogen,  $\text{C}_1\text{-C}_{12}$ alkyl, or phenyl unsubstituted or substituted as indicated above.

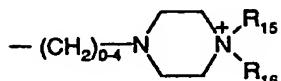
35. A compound of formula (2b)



wherein

$\text{R}_6$  is cyano; halogen; nitro;  $-\text{COOR}_{12}$  or  $-\text{SO}_3\text{R}_{12}$  wherein  $\text{R}_{12}$  is in each case hydrogen, a cation or unsubstituted or substituted  $\text{C}_1\text{-C}_{18}$ alkyl or aryl;  $-\text{SR}_{13}$ ,  $-\text{SO}_2\text{R}_{13}$  or  $-\text{OR}_{13}$  wherein  $\text{R}_{13}$  is in each case hydrogen or unsubstituted or substituted  $\text{C}_1\text{-C}_{18}$ alkyl or aryl;  $-\text{NR}_{14}\text{R}_{15}$ ;  $-\text{N}^{\oplus}\text{R}_{14}\text{R}_{15}\text{R}_{16}$ ;  $-\text{N}(\text{R}_{13})-(\text{CH}_2)_{1-6}\text{NR}_{14}\text{R}_{15}$ ;  $-\text{N}(\text{R}_{13})-(\text{CH}_2)_{1-6}\text{N}^{\oplus}\text{R}_{14}\text{R}_{15}\text{R}_{16}$ ;  $-\text{N}(\text{R}_{13})-\text{N}-\text{R}_{14}\text{R}_{15}$  oder  $-\text{N}(\text{R}_{13})-\text{N}^{\oplus}\text{R}_{14}\text{R}_{15}\text{R}_{16}$ , wherein  $\text{R}_{13}$  can be as defined above and  $\text{R}_{14}$ ,  $\text{R}_{15}$  and  $\text{R}_{16}$  are each independently of the other(s) hydrogen or unsubstituted or hydroxyl-substituted  $\text{C}_1\text{-C}_{12}$ alkyl, or phenyl unsubstituted or substituted as indicated above, or  $\text{R}_{14}$  and  $\text{R}_{15}$  together with the nitrogen atom bonding them form a pyrrolidine,

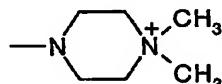
piperidine, morpholine or azepane ring which is unsubstituted or substituted by at least one unsubstituted C<sub>1</sub>-C<sub>4</sub>alkyl and/or substituted C<sub>1</sub>-C<sub>4</sub>alkyl, wherein the nitrogen atom can be quaternized;  
or a radical



wherein R<sub>15</sub> and R<sub>16</sub> are as defined above and the ring may be substituted; and R<sub>1</sub>, R<sub>2</sub>, R<sub>3</sub>, R<sub>4</sub>, R<sub>5</sub>, R<sub>7</sub>, R<sub>8</sub>, R<sub>9</sub>, R<sub>10</sub> and R<sub>11</sub> are each independently of the others as defined above for R<sub>6</sub> or are hydrogen or unsubstituted or substituted C<sub>1</sub>-C<sub>18</sub>alkyl or aryl,

with the proviso that

- (i) at least one of the substituents R<sub>1</sub>-R<sub>11</sub> contains a quaternized nitrogen atom which is not directly bonded to one of the three pyridine rings A, B or C and that
- (ii) Y is neither I<sup>-</sup> nor Cl<sup>-</sup> in the case that R<sub>1</sub>-R<sub>5</sub> and R<sub>7</sub>-R<sub>11</sub> are hydrogen and R<sub>6</sub> is



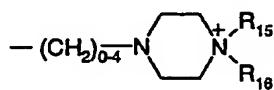
36. A compound according to claim 34 of formula (3)



wherein

R'<sub>6</sub> is cyano; halogen; nitro; -COOR<sub>12</sub> or -SO<sub>3</sub>R<sub>12</sub> wherein R<sub>12</sub> is in each case hydrogen, a cation, C<sub>1</sub>-C<sub>12</sub>alkyl, or phenyl unsubstituted or substituted by C<sub>1</sub>-C<sub>4</sub>alkyl, C<sub>1</sub>-C<sub>4</sub>alkoxy, halogen, cyano, nitro, carboxyl, sulfo, hydroxyl, amino, N-mono- or N,N-di-C<sub>1</sub>-C<sub>4</sub>alkyl-amino unsubstituted or substituted by hydroxy in the alkyl moiety, N-phenylamino, N-naphthylamino, wherein the amino groups may be quaternized, phenyl, phenoxy or by naphthoxy; -SR<sub>13</sub>, -SO<sub>2</sub>R<sub>13</sub> or -OR<sub>13</sub> wherein R<sub>13</sub> is in each case hydrogen, C<sub>1</sub>-C<sub>12</sub>alkyl, or phenyl unsubstituted or substituted as indicated above;

-NR<sub>14</sub>R<sub>15</sub>; -N<sup>o</sup>R<sub>14</sub>R<sub>15</sub>R<sub>16</sub>;  
 -N(R<sub>13</sub>)-(CH<sub>2</sub>)<sub>1-6</sub>NR<sub>14</sub>R<sub>15</sub>; -N(R<sub>13</sub>)-(CH<sub>2</sub>)<sub>1-6</sub>-N<sup>o</sup>R<sub>14</sub>R<sub>15</sub>R<sub>16</sub>; -N(R<sub>13</sub>)-N-R<sub>14</sub>R<sub>15</sub> or  
 -N(R<sub>13</sub>)-N<sup>o</sup>R<sub>14</sub>R<sub>15</sub>R<sub>16</sub>, wherein R<sub>13</sub> can be defined above and R<sub>14</sub>, R<sub>15</sub> and R<sub>16</sub> are each independently of the other(s) hydrogen, unsubstituted or hydroxyl-substituted C<sub>1</sub>-C<sub>12</sub>alkyl, or phenyl unsubstituted or substituted as indicated above, or R<sub>14</sub> and R<sub>15</sub> together with the nitrogen atom bonding them form a pyrrolidine, piperidine, morpholine or azepane ring which is unsubstituted or substituted by at least one unsubstituted C<sub>1</sub>-C<sub>4</sub>alkyl and/or substituted C<sub>1</sub>-C<sub>4</sub>alkyl, wherein the nitrogen atom can be quaternized;  
 or a radical



wherein R<sub>15</sub> and R<sub>16</sub> are as defined above and the ring may be substituted; and R'<sub>3</sub> and R'<sub>9</sub> are as defined above or are hydrogen, C<sub>1</sub>-C<sub>12</sub>alkyl, or phenyl unsubstituted or substituted as indicated above.

37. A compound according to claim 34 or 35, wherein at least one of the substituents R'<sub>3</sub>, R'<sub>6</sub> and R'<sub>9</sub> is one of the following radicals  
 -(C<sub>1</sub>-C<sub>6</sub>alkylene)-N<sup>o</sup>R<sub>14</sub>R<sub>15</sub>R<sub>16</sub>; -N(R<sub>13</sub>)-(C<sub>1</sub>-C<sub>6</sub>alkylene)-N<sup>o</sup>R<sub>14</sub>R<sub>15</sub>R<sub>16</sub>;  
 -N[(C<sub>1</sub>-C<sub>6</sub>alkylene)-N<sup>o</sup>R<sub>14</sub>R<sub>15</sub>R<sub>16</sub>]<sub>2</sub>; -N(R<sub>13</sub>)-N<sup>o</sup>R<sub>14</sub>R<sub>15</sub>R<sub>16</sub>, wherein R<sub>13</sub> is in each case hydrogen, C<sub>1</sub>-C<sub>4</sub>alkyl or phenyl and R<sub>14</sub>, R<sub>15</sub> and R<sub>16</sub> are each independently of the others hydrogen or substituted or unsubstituted C<sub>1</sub>-C<sub>18</sub>alkyl or aryl, or R<sub>14</sub> and R<sub>15</sub> together with the nitrogen atom bonding them form a substituted or unsubstituted 5-, 6- or 7-membered ring which may contain further heteroatoms; or -NR<sub>14</sub>R<sub>15</sub>;  
 -(C<sub>1</sub>-C<sub>6</sub>alkylene)-NR<sub>14</sub>R<sub>15</sub>; -N(R<sub>13</sub>)-(C<sub>1</sub>-C<sub>6</sub>alkylene)-NR<sub>14</sub>R<sub>15</sub>;  
 -N[(C<sub>1</sub>-C<sub>6</sub>alkylene)-NR<sub>14</sub>R<sub>15</sub>]<sub>2</sub>; -N(R<sub>13</sub>)-N-R<sub>14</sub>R<sub>15</sub>, wherein R<sub>13</sub> and R<sub>16</sub> are as defined above and R<sub>14</sub> and R<sub>15</sub> together with the nitrogen atom bonding them form a 5-, 6- or 7-membered ring which is unsubstituted or substituted by at least one unsubstituted C<sub>1</sub>-C<sub>4</sub>alkyl and/or substituted C<sub>1</sub>-C<sub>4</sub>alkyl and may contain further heteroatoms, wherein at least one nitrogen atom which is not bonded to one of the pyridine rings A, B or C is quaternized.

38. A compound according to claim 34 or 36, wherein at least one of the substituents R'<sub>3</sub>, R'<sub>6</sub> and R'<sub>9</sub> is one of the following radicals

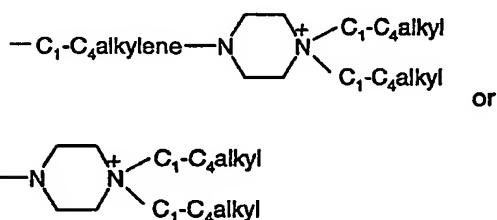
-(C<sub>1</sub>-C<sub>4</sub>alkylene)-N°R<sub>14</sub>R<sub>15</sub>R<sub>16</sub>; -N(R<sub>13</sub>)-(C<sub>1</sub>-C<sub>6</sub>alkylene)-N°R<sub>14</sub>R<sub>15</sub>R<sub>16</sub>;

-N[(C<sub>1</sub>-C<sub>6</sub>alkylene)-N°R<sub>14</sub>R<sub>15</sub>R<sub>16</sub>]<sub>2</sub>; -N(R<sub>13</sub>)-N°R<sub>14</sub>R<sub>15</sub>R<sub>16</sub>, wherein R<sub>13</sub> is as defined above and R<sub>14</sub>, R<sub>15</sub> and R<sub>16</sub> are each independently of the others hydrogen or substituted or unsubstituted C<sub>1</sub>-C<sub>12</sub>alkyl or aryl, or R<sub>14</sub> and R<sub>15</sub> together with the nitrogen atom bonding them form a 5-, 6- or 7-membered ring which is unsubstituted or substituted by at least one unsubstituted C<sub>1</sub>-C<sub>4</sub>alkyl and/or substituted C<sub>1</sub>-C<sub>4</sub>alkyl and may contain further heteroatoms; or

-NR<sub>14</sub>R<sub>15</sub>; -(C<sub>1</sub>-C<sub>6</sub>alkylene)-NR<sub>14</sub>R<sub>15</sub>; -N(R<sub>13</sub>)-(C<sub>1</sub>-C<sub>6</sub>alkylene)-NR<sub>14</sub>R<sub>15</sub>;

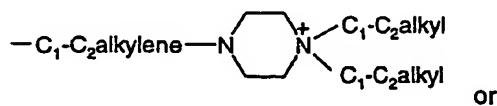
-N[(C<sub>1</sub>-C<sub>6</sub>alkylene)-NR<sub>14</sub>R<sub>15</sub>]<sub>2</sub>; -N(R<sub>13</sub>)-N-R<sub>14</sub>R<sub>15</sub>, wherein R<sub>13</sub> and R<sub>16</sub> are as defined above and R<sub>14</sub> and R<sub>15</sub> together with the nitrogen atom bonding them form a substituted or unsubstituted 5-, 6- or 7-membered ring which may contain further heteroatoms, wherein the nitrogen atom which is not bonded to one of the pyridine rings A, B or C is quaternized.

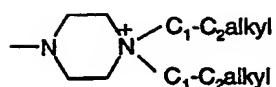
39. Use according to claim 34 or 36, wherein at least one of the substituents R'<sub>3</sub>, R'<sub>6</sub> and R'<sub>9</sub> is one of the following radicals



wherein the unbranched or branched alkylene group may be substituted, and wherein the independently unbranched or branched alkyl groups may be substituted and wherein the piperazine ring may be substituted.

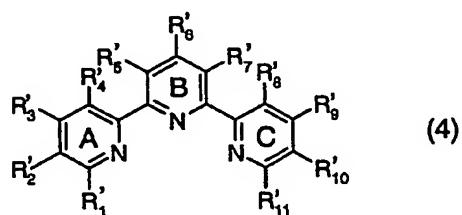
40. Use according to claim 34 or 36, wherein at least one of the substituents R'<sub>3</sub>, R'<sub>6</sub> and R'<sub>9</sub> is one of the following radicals





wherein the unbranched or branched alkylene group may be substituted, and wherein the alkyl groups may be substituted independently of the other and wherein the piperazine ring may be substituted.

41. A compound of the formula (4)

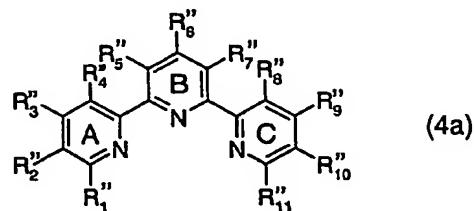


wherein

R'1-R'11 can have the meanings indicated for the substituents R1-R11, with the exception of quaternized nitrogen atoms and the proviso that

- (iv) at least one of the substituents R'1-R'7 is halogen, NO2 or OR18, wherein R18 is substituted or unsubstituted C1-C18alkyl or substituted or unsubstituted aryl, and
- (v) the substituents R'8-R'11 are neither halogen, NO2 nor R18, wherein R18 is as defined under (i).

42. A compound of the formula (4a)



wherein R'',-R''11 have the meanings indicated for the substituents R1-R11 with the exception of quaternized nitrogen atoms and the proviso that at least one of the substituents R'',-R'', contains a quaternizable nitrogen group which is not bonded directly to one of the two pyridine rings A and/or B.

43. A washing, cleaning, disinfecting or bleaching agent, comprising
  - I) 0 - 50 % A) of an anionic surfactant and/or B) of a non-ionic surfactant,
  - II) 0 - 70 % C) of a builder substance,
  - III) 1 - 99 % D) of a peroxide, and
  - IV) E) a metal complex compound of formula (1) in an amount which, in the liquor, gives a concentration of 0.5 – 50 mg/litre of liquor, preferably 1 - 30 mg/litre of liquor, when from 0.5 to 20 g/litre of the washing, cleaning, disinfecting and bleaching agent are added to the liquor,  
the percentages in each case being percentages by weight, based on the total weight of the agent.
44. A solid preparation, comprising
  - a) from 1 to 99 % by weight of a metal complex compound according to claim 31;
  - b) from 1 to 99 % by weight of a binder;
  - c) from 0 to 20 % by weight of an encapsulating material;
  - d) from 0 to 20 % by weight of a further additive; and
  - e) from 0 to 20 % by weight of water.
45. A solid preparation according to claim 44 which is in the form of pellets or granules.